WHAT IS CLAIMED IS:

1. A method of designing a phase shift mask, the method comprising:

identifying edges of a first phase region of a phase shifting mask, the first phase region being located proximate a critical region and the identified edges not being edges of the first phase region adjacent to the critical region; and

defining a boundary phase region along the identified edges of the first phase region.

2. The method of claim 1, further comprising:

identifying edges of a second phase region of the phase shifting mask, the second phase region being located proximate the critical region and the identified edges not being edges of the second phase region adjacent to the critical region; and

defining a second boundary phase region along the identified edges of the second phase region.

3. The method of claim 2, further comprising:

establishing a boundary around the defined boundary phase region; and

assigning area outside of the established boundary to have phase zero.

4. The method of claim 2, further comprising generating a trim mask to remove undesired patterns between first and second phase regions.

1   5.   The method of claim 3, wherein the first phase region is
2 assigned a phase angle of zero and the second phase angle is assigned a
3 phase angle of 180.

1   6.   The method of claim 5, further comprising generating a trim
2 mask to remove undesired patterns between phase 0 and phase 180
3 regions.

1   7.   The method of claim 1, further comprising defining a
2 boundary around ends of a second phase region, wherein the ends are not
3 adjacent the critical region.

1   8.   The method of claim 1, further comprising defining break
2 locations where phase transitions are most likely to occur.

1   9.   The method of claim 8, wherein the break locations have a
2 width that permits patterning and inspection.

1   10.   A method of generating phase shifting patterns to improve
2 the patterning of integrated circuit features needing sub-nominal
3 dimensions, the method comprising:
4   defining critical areas;
5   creating phase areas on either side of the critical areas;
6   assigning opposite phase polarities to the phase areas on
7 either side of the critical areas; and
8   constructing a boundary phase region outside of at least one
9 the edges of the phase areas.

1   11.   The method of claim 10, further comprising:
2   defining break regions where phase transitions are likely to
3 occur;

4   correcting design rule violations; and

5   applying optical proximity and process corrections to phase

6 areas to allow proper pattern generation.

1   12.   The method of claim 10, further comprising generating a trim

2 mask to remove undesired patterns between phase areas outside of a

3 desired pattern.

1   13.   The method of claim 12, wherein the generating is done by

2 oversizing boundary and break regions.

1   14.   A method of enhancing clear field phase shift masks with

2 boundary regions around outside edges of phase 0 and phase 180

3 regions, the method comprising:

4   assigning phase polarities to phase areas, the phase areas

5 including first phase areas and second phase areas;

6   defining edges of the assigned phase areas;

7   defining a first phase boundary region around the defined

8 edges of the first phase area; and

9   defining a second phase boundary region around at least a

10 portion of the defined edges of the second phase area.

1   15.   The method of claim 14, wherein defining edges of the

2 assigned phase areas includes defining break regions where phase

3 transitions occur and generating polygons including edges but excluding

4 break regions, wherein the polygons are merged with the assigned phase

5 areas.

1   16.   The method of claim 14, further comprising generating a trim

2 mask to remove undesired patterns between the first and second phase

3 areas.

1 17. The method of claim 16, wherein the trim mask does not
2 cover all or any of the second phase boundary region around at least a
3 portion of the second phase area.

1 18. The method of claim 16, wherein the generating is done by
2 oversizing the boundary and break regions.

1 19. A mask configured for use in an integrated circuit
2 manufacturing process, the mask comprising:
3 a critical section defined by first edges of a phase zero region
4 and first edges of a phase 180 region;
5 a first boundary phase region located outside second edges
6 of the phase 180 region, the second edges of the phase 180 region being
7 different than the first edges of the phase 180 region, wherein the first
8 boundary phase region includes an opaque material; and
9 a second boundary phase region around at least a portion of
10 second edges of the phase 0 region, the second edges of the phase 0
11 region being different than the first edges of the phase 0 region.

1 20. The mask of claim 19, further comprising a region outside of
2 defined areas having a phase of zero.

1 21. The mask of claim 19, wherein the second boundary phase
2 region includes an opaque material.